

Medicine Use and Mental Health in Japanese Adolescents: The Impact of the Rebelliousness Phase

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Background: Global trends in self-medication indicate that students begin to use medicines in junior high school, and without appropriate interventions at this time, the problem may worsen in the future.

Objective: There is little research on the relationship between adolescent identity development and perceptions and behaviors related to medicine use. Therefore, in order to fill this gap, this study will investigate how developmental conflicts affect medicine use among Japanese junior high school students.

Method: In this study, we surveyed junior high school students and their parents about their behaviors related to the use of medicine and their perceptions of whether they considered it important or not, in terms of three aspects: reading the warning labels, adhering to the dose times, and adhering to the dose. In addition, students' "rebelliousness" was measured by a scale we developed, and the WHO-5 was used to assess students' depressive tendencies. As for the parents, their experiences of misuse of medicine were also ascertained.

Results: The results showed that students' perceptions and behaviors toward medicine use were only marginally related to those of their parents. There was a gap between the perceptions and behaviors of both students and parents. Of the three factors on the rebelliousness scale (rebellion, conflict, and relationship), conflict and rebellion were positively correlated with inappropriate use of medicine at the behavioral and cognitive levels. Depressive tendencies were detected in 14.5 % of the students and should be given more attention in the future. Furthermore, the sub-items of the rebelliousness scale, conflict and perception of dose, were significantly correlated with depressive tendencies based on the WHO-5.

Conclusion: The results of this study indicate that perceptions and behaviors of inappropriate medicine use are associated with rebelliousness. They also had an impact on mental health. There is a gap between the behavior and perceptions of both parents and junior high school students, and many of the parents have experienced misuse of medicine. Since parents are the main source of advice for junior high school students when they use medicine, medicine use education and drug abuse prevention education would be more effective if implemented for both parents and students.

Keywords: medicine use, junior high school students, rebelliousness, mental health

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I. Introduction

1. Parental Influence on Student Medicine Use

In a systematic review of the global trends on self-medication practices, it was shown that students from junior high and high school often start using medicines during these years¹⁾. Although individual problems are often small initially, lack of appropriate intervention and care at this critical stage may aggravate the problem

going forward. As the World Health Organization (WHO)²⁾ has pointed out, young people are generally regarded as healthy. Therefore, the physical and mental development and health issues of the young do not receive adequate attention³⁾. To address health problems in adolescents and young adults, it is essential to consider their unique psycho-physical states. During adolescence, the "failure to handle conflict" can result in the acting out of bewildering feelings, referred to as "rebellion"⁴⁾, which can influence their behaviors, including medicine

misuse.

Pathways to adolescent identity development are assumed to be diverse across different cultures. Thus, adolescent identity development in Japan will be different from the Western developmental identity process, including instability and uncertainty⁵⁾. To date, there are no studies that focus on the relationships between Japanese adolescents' identity development and their perceptions and behaviors concerning medicine use. To establish developmentally appropriate medicine use education and drug abuse prevention education programs, we need to examine the effect of psychological development on perception and behavior relevant to medicine use in Japan⁶⁾.

To fill this gap in the literature, from the perspectives of both cognition and behavior, our study investigated the relationships among the developmental state of rebellious, poor mental health, and medicine use in Japanese junior high school students. In line with a previous study of parental influence on student medicine use⁷⁾, we focused on “medicine use behavior” (engagement in appropriate behaviors) and “perceptions of appropriate medicine use behavior” (valuing appropriate behaviors). We also investigated parental perceptions and behaviors related to medicine use, as well as medicine misuse experiences, all of which are thought to have a significant impact on junior high school students.

2. Rebelliousness as a Mentality Unique to the Junior High School Stage

Junior high school years are the gateway to young adulthood and are often regarded as the most energetic and promising cycle of one's life. Adolescents are commonly portrayed as highly sensitive, with their behaviors often hijacked by their emotions⁸⁾. During this life stage, adolescents begin to value friends more than family⁹⁾, and become sensitive to interpersonal relationships. It is also a time of instability when a conflict may arise between feelings of independence from and dependence on their parents and adults around them¹⁰⁾. Even so, Sakai et al⁷⁾ found that among junior high school students using medicine, 62.2% of male students and 73.8% of female students reported that their parents or guardians were the most reliable source of information and the best people to consult about this, second to medical experts. However, although such consultations may be frequent, students' attitudes toward the information may not always be positive. This “rebellious” mentality may affect the willingness

of adolescents to consult their parents, causing them to “rebel” against what they are taught, which may affect the proper use of medicine.

Moreover, it has been shown that adolescents are more vulnerable to socially deviant triggers and more likely to engage in problematic behaviors¹¹⁾. Thus, substance use, even in the case of prescription medicines, needs to be examined from various perspectives.

A survey of junior high school students' medicine use behavior showed that despite awareness of appropriate medicine use, they often disregarded this and acted insolently⁷⁾¹²⁾. Thus, there is a disconnect between awareness and behavior concerning appropriate adolescent medicine use. Programs focusing on this gap and the sharing of issues with friends have been found useful in reducing this disconnect; however, to date, there are few such programs in school settings. In one of the few examples, an active teaching strategy that incorporates small-group discussions has been used successfully to improve the attitudes of junior high and high school students to promote changes related to behavior⁶⁾. Thus, it is important to apply a methodological approach that can integrate cognition and behavior.

3. Approaches to High-Risk Students and General Health Education

Apart from natural feelings of rebellion experienced by many, some adolescents engage in dangerous or self-harming behaviors when they are struggling with problems, they feel they cannot discuss. This is called the “deliberate self-harm syndrome”¹³⁾ and has been described as consisting of five disorders and negative behaviors: drug abuse, violent and dangerous behavior, eating disorders, self-harm, and sexual misconduct. All of these are potentially dangerous conditions or behaviors that can be fatal. It is difficult to get adolescents who exhibit “deliberate self-harm syndrome” to stop such behavior. When these behaviors become severe, they can lead to suicide. According to the Japanese Ministry of Health and Welfare¹⁴⁾, the suicide rate among people under 20 years has remained generally unchanged since 1998. Although the suicide rate is declining among those in their 20s and 30s, the rate of decline for these age groups is smaller than that of those in their 40s and above.

Teenage mental health problems are a global issue, and the relationship between depression and substance intake has been well documented¹⁵⁾. The WHO lists medicine use, sexual risk, smoking, and drinking as

risk-taking behaviors. It also warns that these behaviors increase the likelihood of lower educational attainment, injury, and involvement in crime and death. As discussed, adolescence includes the rebellious stage, a time when the young can be easily influenced by peers, and are prone to delinquency⁴⁾.

Hawton, Rodham, and Evans¹⁶⁾ stated that the closest support resource for adolescents engaging in these behaviors is their school peers. Positive mental health including suicide prevention is not seen as part of general health awareness among junior and high school students but rather as form of health education that can convey the importance of the support offered by those close to them and the importance of help-seeking behaviors¹⁷⁾. Thus, there is a need to communicate correct knowledge of medicines in school education as well as help-seeking behavior. With this kind of education, we can promote better health behaviors among adolescents dealing with unstable psychological conditions to improve attitudes and create positive feelings. These programs are effective when implemented by the school pharmacist and school nurse, who are both health professionals and caregivers. This underscores the importance of working together to balance the approach to high-risk groups and even general students.

4. Medicine Use Education in Japanese Schools

In March 2012, the WHO published a report titled “Responsible use of medicines.” On its list of 12 key interventions, number 9 was a more in-depth discussion of medicines, an item aimed at educating the public.

In Japan, new guidelines for teaching in schools were put in effect that same year, which for the first time, included education on medicine use in the health and physical education curriculum. At present, the school pharmacist is responsible for teaching this curriculum in collaboration with the classroom teacher, health and physical education teacher, and the *Yogo* teacher (school nurse teacher).

II. Methods

Since education on the use of medicines has been introduced in the Courses of Study, it is expected that the awareness and attitude of junior high school students toward medicines will change in the future. In this study, we first aimed to investigate the current status of appropriate medicine use behavior and awareness among junior high school students. In selecting the study sites,

we chose municipalities in the Tokyo metropolitan area, where demographic data and socioeconomic indicators show the appearance of an average Japanese city. For example, the percentage of the population under the age of 15 in Japan is 12.1%, but M City shows a similar value of 12.2% in 2021. We requested a survey at a Junior High School, where the PTA officer was an acquaintance of the researcher; the Junior High School was positioned as an almost average school size, with a student population within 1/4 SD of the average number of students among the 19 junior high schools in this city. Questionnaires were distributed to all 476 the first- through the third-year students at a public junior high school in Tokyo. Of these, 274 pairs of students and parents or guardians (57.6 % response rate) responded. The questionnaires were distributed in July 2014 by the classroom teachers at each grade level, and were collected at school after completion at home.

Of the 259 student/parent paired questionnaires collected, there were some missing values in the responses. Excluding those, 227 pairs were considered valid (47.7 % valid response rate). The number of students in each grade was 70 (30.8 %) in the first, 71 (31.3 %) in the second, 86 (37.9 %) in the third. In terms of the greatest gender distribution by grade, there were 27 boys (38.6 %) and 43 girls (61.4 %) in the first grade. Not equal to 100 % due to rounding. The parents/guardians included 8 fathers (3.5 %) and 219 mothers (96.5 %).

The questionnaire items covered student and parent medicine use perceptions and behaviors (e.g., interpretation of the warning labels, adherence to the prescribed dose schedule, adherence to the prescribed dose amount); students' access to advice on medicine use (parents, siblings, friends, professionals, teachers); students' feelings and attitudes specific to the rebellious phase and students' mental health conditions (measured by the WHO-5, a short self-reported measure of current mental wellbeing); and parents' experience with the misuse of medicines¹⁸⁾.

The variables concerning students' feelings and attitudes (Rebelliousness Scale) were developed specifically for this study. Our Rebelliousness Scale consisted of 10 items based on previous studies¹⁹⁾²⁰⁾. The 10 statements were: “I can't listen to what my parents say,” “Sometimes I want to disobey my parents' instructions,” “I have been said to be rebellious,” “There are things I can't understand according to the norms of society,” “What my parents say is often convincing,” “Parents are always right,” “My parents understand my ideas,” “I have never disobeyed parental instructions,”

“I do not have strong desires and opinions and do not conflict with my parents,” and “Parents often have equal relationships, like friends.” Scores were calculated for each item using a binary “yes” or “no” method and divided into three subscales of “rebellion,” “conflict,” and “relationship.”

A binary measure was used to capture medicine use behavior⁷⁾ as follows: “I always read the medicine warning label” equated to one, and “sometimes,” “rarely,” and “not at all” equated to zero. Creating appropriate and inappropriate behavioral groups for these scores, respectively, we then compared the two groups.

A binary measure was used to capture medicine use perceptions⁷⁾ by asking respondents to rank the importance of reading medicine warning label: “Very important” was assigned one, and “Important,” “Not so important,” and “Not very important” were assigned a score of zero. The two groups were compared by creating compliance and non-compliance perception groups, assigned one and zero, respectively. This item was also rated by parents and guardians.

A student's recent mental health status was measured according to the WHO-5. For parental experience with no misuse of medicines, zero was scored, while any misuse of one or more, one was scored.

IBM SPSS STATISTICS 26.0 was used for all statistical regression analyses. The significance level was equal to or less than 5%.

The survey was a closed-ended questionnaire, which clearly stated that respondents were not required to answer any questions they preferred not to. The survey did not require respondents to write their names. When matching the questionnaires collected from parents and students, we assigned ID numbers to each questionnaire in advance and matched them with the numbers after they were collected. An explanatory document was attached to the questionnaire. During the survey, we obtained the consent of the students and their parents or guardians. The study was approved by the University Research Ethics Committee (No. 11, 2014).

III. Results

1. Student and Parents: Medicine Use Perception and Behavior

Parents were the most common response students consulted when taking their medicine, with 84.2 % of the students saying they “always” or “sometimes” consulted their parents. By gender, 86.1 % of the girls and 81.7 %

of the boys indicated that they “always” or “sometimes” consulted with parents or guardians. As the grades increased, the percentage of students who “always” or “sometimes” consulted their parents decreased. The number of students by gender in each grade was 26 boys (96.3 %) and 41 girls (93 %) in the first, 27 boys (79.4 %) and 33 girls (69.2 %) in the second, 32 boys (74.4 %) and 33 girls (76.7 %) in the third. The next most common response was “medical professionals,” with 36.1 % of girls and 48 % of boys consulting them “always” or “sometimes.”

Regarding perceptions, 48 % of the students and 45 % of the parents answered “very important” for reading warning labels, and 54 % and 42 % for following dose timing, and 70 % and 67 % for following dose amount, respectively. In terms of actual behavior, fewer parents chose inappropriate behavior than students, especially in terms of reading warning labels.

Table 1 shows the gaps between medicine use behaviors and perceptions among students and parents. Both students and parents were aware of the need to comply with the direction in terms of adhering to the dose (“dose”), and few people behaved inappropriately (7.5% of the students and 15.6% of the parents). However, when it comes to reading the warning signs (“Reading warning label” in **Table 1**), 58.7% of the students and 56.9% of the parents who were aware of compliance were inappropriate in terms of behavior. In addition, 35.0% of the students and 50.5% of the parents who were aware of the compliance of taking medicine on time (“Time of dose” in **Table 1**) were inappropriate in terms of behavior. In other words, almost more than half of the students and their parents had a gap between their behavior and their perception.

The kappa coefficients were larger for parents with respect to “Reading warning label” and “Dose”, indicating a smaller discrepancy between behavior and perception in these situations. On the other hand, the coincidence was higher for students regarding the time of taking the medicine (“Time of dose”).

In terms of parental medicine use, 95.2% stated that they had one or more misuse experience, implying that most parents had some kind of misuse experience. As shown in **Table 2**, the number of misuse cases was significantly higher in the inappropriate behavior group and perception group than in the appropriate behavior group and perception group. In particular, the number of misuse cases was significantly higher in the inappropriate dose-related behavior group than in the appropriate dose-related behavior group (effect size $r=0.35$).

Table 1 Gaps of appropriate medicine use perceptions and behaviors among students and parents

		Students [n (%)]				Parents [n (%)]				
				Perception				Perception		
		Non-compliance	Compliance	Pearson's chi-squared	kappa coefficient	Non-compliance	Compliance	Pearson's chi-squared	kappa coefficient	
		Notice (%)				Notice (%)				
Behavior	Reading warning label	Inappropriate	110 (93.2)	64 (58.7)	37.694	0.352	118 (94.4)	58 (56.9)	45.434	0.393
		Appropriate	8 (6.8)	45 (41.3)	$p<0.001$	$p<0.001$	7 (5.6)	44 (43.1)	$p<0.001$	$p<0.001$
		Total	118 (100.0)	109 (100.0)			125 (100.0)	102(100.0)		
			Time of dose (%)				Time of dose (%)			
	Time of dose	Inappropriate	84 (80.8)	43 (35.0)	47.982	0.45	119 (90.2)	48 (50.5)	44.607	0.418
		Appropriate	20 (19.2)	80 (65.0)	$p<0.001$	$p<0.001$	13 (9.8)	47 (49.5)	$p<0.001$	$p<0.001$
		Total	104 (100.0)	123 (100.0)			132 (100.0)	95(100.0)		
			Dose (%)				Dose (%)			
	Dose	Inappropriate	23 (33.8)	12 (7.5)	25.217	0.305	38 (84.4)	7 (15.6)	65.46	0.505
		Appropriate	45 (66.2)	147 (92.5)	$p<0.001$	$p<0.001$	38 (20.9)	144 (79.1)	$p<0.001$	$p<0.001$
		Total	68 (100.0)	159 (100.0)			79 (100.0)	151 (100.0)		

Table 2 Association between parents' medicine misuse experience and their medicine use perception/behavior

		Perception					
		Reading warning label		Time of dose		Dose	
		Appropriate	Inappropriate	Appropriate	Inappropriate	Appropriate	Inappropriate
<i>n</i>		102	125	95	132	151	76
Misuse experience (times)		4.01	4.92	3.94	4.92	4.25	5.04
SD		2.16	2.64	2.11	2.63	2.32	2.7
Student's <i>t</i> -test		2.80		3.13	(Welch's <i>t</i> -test)	2.3	
<i>P</i>		<0.01		<0.01		<0.05	
<i>r</i>		0.18	small	0.21	small	0.15	small
		Behavior					
		Reading warning label		Time of dose		Dose	
		Appropriate	Inappropriate	Appropriate	Inappropriate	Appropriate	Inappropriate
<i>n</i>		51	176	60	167	182	45
Misuse experience (times)		4.14	4.62	3.47	4.89	4.08	6.27
SD		2.35	2.5	2.36	2.41	2.33	2.27
Student's <i>t</i> -test		1.23		3.97		5.67	
<i>p</i>		0.22		<0.001		<0.001	
<i>r</i>		0.08	small	0.25	small	0.35	medium

Note. SD, standard deviation

Furthermore, when we examined the relationship between inappropriate use/perceptions of parents and students, only a weak negative correlation was found for the perceptions of reading warning label (Pearson's correlation coefficient = -0.194; $p < 0.01$).

2. Relationship Between Students' Mental Health Status, Rebelliousness Scale Scores, and Medicine Use

Considering the scores by grade of the mental health status measured using the WHO-5, the students of the third grade showed the lowest score among all the students. Thirty-three students (14.5%, boys: 11, girls: 22) showed a tendency to be depressed. There were no significant differences in mean scores or the number of depressive tendencies across gender and grade.

Hayashi's quantification method-III showed that the Rebelliousness Scale can be divided into three subscales: "Rebellion" and "Conflict" and "Relationship" (Table 3). The left side of Table 3 shows the calculated factor loadings for all 10 items. The tenth item, which had a factor loading of less than 0.4 for any of the three factors, was deleted from the calculation, and nine items were used as the rebelliousness scale. The right side shows the factor loadings of the nine items. The alpha coefficient for the nine items was calculated to be 0.702, indicating that the scale was internally consistent and reliable. A one-way analysis of variance comparing the means between

the grades for the total scores of the nine items showed no significant differences (1st grade 14.1 ± 2.3 ; 2nd grade 14.5 ± 2.0 ; 3rd grade 14.7 ± 2.3).

Table 4 shows the results of comparing the mean values of the rebelliousness scale scores of the appropriate and inappropriate groups of medicine use behavior and perception. The scores of "Conflicts", a subscale of the Rebelliousness Scale, were higher the more inappropriate the perception of medicine use was. "Conflict" scores were higher for inappropriate perceptions of reading warning labels, time of dose, and dose. Among the subscales, "Relationship" showed no significant results. Those with inappropriate perceptions of dose had significantly higher scores for "Rebellion".

3. Correlations Between Mental Health Status and Rebelliousness Scale Scores, and Medicine Use Behavior and Perception

The relationships among mental status, the Rebelliousness Scale, and medicine use behavior were examined with quantification method I, with the WHO-5 scores as the independent variables, sex, grade, three subscale scores of the Rebelliousness Scale, and medicine use behavior and perception (reading warning label, time of dose, and dose, respectively) as explanatory variables. Conflict had a negative effect (Standardized partial regression coefficient = -0.208, $p < 0.01$), and perception of appropriate dose had a positive effect (Standardized

Table 3 Structural matrix for Rebelliousness Scales by Hayashi's quantification method-III

	Factor			Factor		
	1	2	3	1	2	3
1. Sometimes I want to disobey my parents' instructions	0.751	-0.28	-0.302	0.743	0.146	0.080
2. I have been said to be in rebellion	0.737	-0.144	-0.072	0.755	0.263	0.303
5. I cannot listen to what my parents say	0.680	-0.522	-0.092	0.681	0.532	0.112
6. What my parents say is often convincing	-0.362	0.762	0.345	0.362	0.774	0.372
3. Parents are usually right	-0.077	0.768	0.207	0.082	0.761	0.223
4. My parents understand my idea	0.391	-0.644	0.188	0.397	0.655	-0.165
10. There are things I cannot understand according to the rules of the society	0.266	-0.315	-0.192			
8. Never disobeyed parental instructions	-0.018	0.094	0.746	0.024	0.070	0.738
7. Parents often have equal relationships, like friends	-0.261	0.212	0.611	0.246	0.228	0.626
9. I do not have strong desires and opinions and do not have conflicts with my parents	-0.472	0.296	0.553	0.463	0.306	0.568

Note. Normalization of principal components of variables. Rotation: Promax method with Kaiser normalization

Table 4 Comparison of means of Rebelliousness Scale Scores between appropriate group and inappropriate group in behavior / perception regarding reading warning label, time of dose and dose by student's t-test

	Groups	Behavior					Perception						
		n	mean	SD	t value	P	n	mean	SD	t value	P	d	
Reading warning label													
Rebellion	Inappropriate	174	1.67	0.34	-0.01	0.992	118	1.68	0.33	0.25	0.804		
	Appropriate	53	1.67	0.37			109	1.67	0.35				
Conflict	Inappropriate	174	1.44	0.32	0.43	0.670	118	1.49	0.32	2.66	0.008	0.31	
	Appropriate	53	1.42	0.32			109	1.38	0.31				
Relationship	Inappropriate	174	1.75	0.28	-1.30	0.196	118	1.75	0.27	-0.93	0.353		
	Appropriate	53	1.81	0.25			109	1.78	0.28				
Time of dose													
Rebellion	Inappropriate	127	1.70	0.32	1.41	0.161	104	1.71	0.32	1.32	0.187		
	Appropriate	100	1.64	0.36			123	1.65	0.36				
Conflict	Inappropriate	127	1.47	0.31	1.85	0.066	104	1.49	0.31	2.50	0.013	0.31	
	Appropriate	100	1.39	0.32			123	1.39	0.32				
Relationship	Inappropriate	127	1.78	0.28	1.40	0.163	104	1.75	0.28	-0.61	0.544		
	Appropriate	100	1.73	0.27			123	1.77	0.27				
Dose													
Rebellion	Inappropriate	35	1.65	0.34	-0.47	0.642	68	1.75	0.31	2.106	0.036	0.34	
	Appropriate	192	1.68	0.34			159	1.64	0.35				
Conflict	Inappropriate	35	1.46	0.32	0.57	0.57	68	1.53	0.28	3.094	*	0.002	0.31
	Appropriate	192	1.43	0.32			159	1.40	0.32				
Relationship	Inappropriate	35	1.70	0.33	-1.57	* 0.119	68	1.74	0.29	-0.783	0.434		
	Appropriate	192	1.77	0.26			159	1.77	0.27				

Note. *Welch's *t*-test

partial regression coefficient = 0.220, $p < 0.05$). The adjusted R^2 was 0.141 and significant ($p < 0.001$).

IV. Discussion

1. Gaps Between Behaviors and Perceptions in the Use of Medicine

There was a gap between the behaviors and perceptions of the students and the parents in their use of medicine. Both students and parents were aware of the importance of adhering to the dose, but they did not necessarily read the warning labels and follow the time of dose. The results were similar to those in previous studies^{7,21)}, suggesting that there is a lack of awareness of the risks of nonadherence to dose schedule and of ignoring warning labels. We confirmed that these items need to be emphasized in educational programs and at medical institutions.

The factors causing this gap are currently unclear. It is possible that the students' surroundings may be influencing the increase in their inappropriate responses

in terms of actual medicine behavior compared with their perceptions or awareness of medicine use. Sakai et al.⁷⁾ hypothesized that the environmental context of medicine use is formed through a process where adolescents observe their parents' and friends' behaviors related to medicine use, imprint these behaviors, and then reinforce and copy them. However, in our study, we found no correlation between parental misuse of medicines and students' perceptions, even though many of the parents had a history of misuse, and the number of experiences affected their behaviors and perceptions of inappropriate use.

The percentage of students who consulted their parents when they took their medicine was especially high in the first year of junior high school. These results suggest that it is important to provide parents with awareness-raising intervention regarding the proper use of medicine. It is difficult to provide an opportunity for parents to learn together with students, but it is possible, for example, a teacher decides to do the health and physical education class in which medicine use education is included on the

School Visit Day.

In a systematic review of 163 studies, parents were the most frequent source of medicine information for the young¹⁾. In terms of interventions for parents, Marsiglia, Baldwin-White, and Castro²²⁾ found that holding substance abuse prevention education seminars with parents while introducing family educational programs on parenting, improved the effectiveness of abuse prevention education. In educational programs conducted in schools, it is important not only to provide information to parents, but also to set up opportunities for parents and students to participate together, so that students and parents can exchange views and deepen their understanding of each other, while arousing interest in the proper use of medicines and effective management of medicines.

2. Relationship Between Rebelliousness and Appropriate Medicine Use

The Rebelliousness Scale, developed for this study had three subscales, namely, “rebellion,” “conflict,” and “relationship.” Among them, “rebellion” and “conflict” were found to relate to the perception of medicine use. Our results imply that students who are in conflict with adult views or are repulsed by the difference between their own thoughts and common norms may be unable to accept adult advice when they acquire pertinent knowledge about medicine use. As adolescents develop logical thinking, they become more sensitive to “is it logically correct” than to “who said it?”²³⁾. Therefore, for students in the rebelliousness learning about the proper use of medicines, one effective method would be to provide convincing reasons and scientific evidence without imposing societal norms. In other words, we need to be creative in how we teach students who are rebellious. In medicine use education, it is important to incorporate developmentally appropriate teaching and explanation methodologies.

In this study, perceptions of appropriate medicine use among junior high school students were shown to be associated with mental health status. Furthermore, perceptions were also associated with conflict, a sub-item on the Rebelliousness Scale. According to one study, students who are depressed are more likely to engage in risky behaviors, such as delinquency and self-harm²⁴⁾ and thus may also engage in inappropriate medicine use. In our study, 14.5% of the students were found to have depressive tendencies as measured by the WHO-5. Other studies have reported 22.8%²⁵⁾, 27.9%²⁶⁾, and 28.8%²⁷⁾ and the results of this study were lower than

these. Nagai²⁸⁾ pointed out the need to examine the cut-off point considering the recent prevalence of junior high school students. In these studies, Birlerson Self-rating Scale for Depression Disorder²⁵⁾ and DSRS-C was used²⁶⁾²⁷⁾. In the present study, WHO-5 was used to reduce the number of questionnaire items; with regard to the WHO-5, there are diverse results regarding the percentage of those with depressive tendencies, including medical students (28.5 %)²⁹⁾ and the general public (15 %)³⁰⁾. For high school students, some studies have used a simpler form of the S-WHO-5, but no mention has been made of the percentage of those with depressive tendencies. Since this study was conducted in only one school, it will be necessary to increase the sample size in the future and examine in more detail the percentage of students with depressive tendencies when the WHO-5 is used with junior high school students. In contemporary Japan, medicine use education and drug abuse prevention education are conducted in a typical junior high school where there are multiple high-risk students with mental health problems in the class. However, given the inclusion of these high-risk students, it is necessary to consider what educational methods are appropriate for them.

Junior high school students need to be taught the importance of seeking help before inappropriate use or intentionally harmful behavior in facing anxiety or worrying. At the same time, we should teach them the importance of paying attention to those around them, their classmates, and offering support rather than turning a blind eye. Suh and Ikeda²⁹⁾ mentioned a sustainable self-help method where peers help and support peers that is their new approach for intervention aiming prevention of drug abuse. They developed a substance abuse prevention education program in which participants learned about health education and knowledge and information about alcoholism and substance abuse, primarily³¹⁾.

Further, Yamada et al.⁶⁾ confirmed that an active teaching strategy incorporating small-group discussions can promote changes in junior and senior high school students' emotional attitudes and behaviors. Based on our results, there is a need to improve the comfort level of individuals in requesting assistance and provide social support for education on medicine use that includes proper usage.

3. Limitations and Future Directions

The limitations of our study are as follows. First, the request for parental participation was made through the

students; therefore, it is possible that the parents who responded to the survey were relatively more interested in medicine. Second, since the survey was conducted in a single junior high school, the school's characteristics may have affected the responses of the students. In this study, we were not able to compare the academic performance of the students or the school atmosphere with other schools. As for the Rebelliousness Scale, the Cronbach's alpha coefficient was 0.702, indicating some internal consistency, but validity was not fully examined. In the future, a larger-scale survey could be conducted to verify the results.

Junior high school students face issues surrounding drug abuse and dependence, such as the association between overdose and poor mental health (especially self-harm and suicide), increasing dependence on prescription medicines, and the continued problem of abuse and dependence on over-the-counter medicines (antitussives and cold remedies)³⁰. According to Shimane³¹, in Japan, among adolescents and young adults, there are many who are at potential risk for drug abuse, although the statistical data shows that the problem seems to be decreasing. Shimane mentions the importance of “less than secondary prevention” for such those at risk.

The characteristics of adolescent psychopathology, including a rebellious mind and behavior, relate to behaviors and perceptions of medicine use. Intrusive medicine use education and drug abuse prevention education aimed at conflicted and rebellious junior high school students may be counterproductive. Junior high school students should be recognized as individuals able to hold discussions with adults as they stand on the threshold of maturity. We conclude that a curriculum based on scientific evidence that is not pushy or overly emotional may be more effective in promoting the proper use of medicine and drug abuse prevention among junior high school students.

V. Conclusions

The results of this study showed that rebellious set of minds was associated with perceptions and behavior of medicine use. It is also detected that the parents are often the main source of advice for students in case of taking medicine, but many of them have also experienced medicine misuse. In order to change behaviors related to medicine use, educational programs that bring important and accurate knowledge to both parents and students are needed. The adolescents' rebellious mental state explained their maladaptive state of mental health, along

with their perception of inappropriate medicine use. It was found that education on medicine use and drug abuse prevention in a way that does not stimulate rebelliousness among the junior-high school students can lead to more appropriate medicine use behavior and perceptions, leading to better mental health.

References

- 1) Shehnaz SI, Agarwal AK, Khan N: A systematic review of self-medication practices among adolescents. *Journal of Adolescent Health* 55: 467–483, 2014
- 2) the World Health Organization (WHO): Fact sheet: Health of young people. Available at: <https://social.un.org/youthyear/docs/who-youth-health.pdf>. Accessed April 1, 2021
- 3) UK Mental Health Foundation: Children and young people. 2016. Available at: <https://www.mentalhealth.org.uk/a-to-z/c/children-and-young-people>. Accessed October 1, 2020
- 4) Warr M: Parents, peers, and delinquency. *Social Forces* 72: 247–264, 1993
- 5) Sugimura K: Adolescent identity development in Japan. *Child Development Perspectives* 14: 71–77, 2020
- 6) Yamada J, Takayanagi R, Yokoyama H et al.: A survey of junior high school students' attitudes toward the proper use of drugs and the effects of education by school pharmacists. *Yakugaku Zasshi* 132: 215–224, 2012 (in Japanese with English abstract)
- 7) Sakai C, Kawabata T, Song S et al.: Junior high school and high school students' behavior and attitudes related to medicine use. *Japanese Journal of School Health* 55: 295–307, 2013 (in Japanese with English abstract)
- 8) Guyera AE, Silk JS, Nelson EE: The neurobiology of the emotional adolescent: From the inside out. *Neuroscience & Biobehavioral Reviews* 70: 74–85, 2016
- 9) Lam CB, McHale SM, Crouter AC: Time with peers from middle childhood to late adolescence: Developmental course and adjustment correlates. *Child Development* 85: 1677–1693, 2014
- 10) Adams RE, Laursen B: The correlated of conflict: Disagreement is not necessarily detrimental. *Journal of Family Psychology* 21: 445–458, 2007
- 11) Rusby JC, Light JM, Crowley R et al.: Influence of parent-youth relationship, parental monitoring, and parent substance use on adolescent substance use onset. *Journal of Family Psychology* 32: 310–320, 2018
- 12) Sakai C, Iguchi K, Tachi T et al.: Association between awareness of taking education on medicines, and knowledge, attitudes and behavior about medicines among Japanese high school students. *School Health* 15: 43–53, 2019
- 13) Pattison EM, Kahan J: The deliberate self-harm syndrome. *The American Journal of Psychiatry* 140: 867–872, 1983
- 14) Ministry of Health, Labour and Welfare: White paper of suicide: 2-3 situation of suicide among young people. 47, 2018. Available at: <https://www.mhlw.go.jp/wp/hakusyo/jisatsu/19-2/index.html>. Accessed October 1, 2020
- 15) Wichaidit W, Pruphetkaew N, Assanangkornchai S: Variations by sex and age in the association between alcohol use and depressed mood among Thai adolescents. *PLOS One* 14: e0225609, 2019
- 16) Hawton K, Rodham K, Evans E: *By their own young hand*. Jessica Kingsley Publishers, London, UK, 2006
- 17) Matsumoto T, Imamura F: Self-injury in Japanese junior and

senior high-school students: Prevalence and association with substance use. *Psychiatry and Clinical Neurosciences* 62: 123–125, 2008

- 18) The Japan Pharmaceutical Manufacturers Association: The 13th Consumer awareness survey on medicines and the pharmaceutical industry. 2019. Available at: http://www.jpma.or.jp/about/issue/gratis/survey/pdf/13_all.pdf. Accessed October 1, 2020
- 19) Balswick JO, Macrides C: Parental stimulus for adolescent rebellion. *Adolescence* 10: 253–266, 1975
- 20) Kerr M, Stattin H: What parents know, how they know it, and several forms of adolescent adjustment: Further support for a reinterpretation of monitoring. *Developmental Psychology* 36: 366–380, 2000
- 21) Sakai C, Kawabata T, Song S et al.: Actual conditions and related factors in the drug use behavior of junior high school students. *Japan Journal of School Health*: 54, 227–239, 2012 (in Japanese with English abstract)
- 22) Marsiglia FF, Baldwin-White A, Castro FG: The initial assessment of a community-based intervention with Mexican-heritage parents in boosting the effects of a substance use prevention intervention with youth. *Journal of Community Psychology* 47: 195–209, 2019
- 23) Obokata A, Muto T: The impact of deviant peers on junior high school students' mild delinquency. *Bulletin of the research center for child and adolescent development and education. Ochanomizu University* 2: 75–84, 2004 (in Japanese)
- 24) Shimoda Y, Ishizu K, Ohtsuki T: Examining the changing patterns of depression in Japanese junior high school students over one year. *Shinrigaku Kenkyu* 88: 142–150, 2017 (in Japanese with English abstract)
- 25) Denda K: Mood disorders in children and adolescents: Clinical features, modern views and recent problems. *Japanese Journal of Child and Adolescent Psychiatry* 49: 89-100, 2008 (in Japanese with English abstract)
- 26) Maruyama E: The relationship between social support and depressive symptoms in junior high school children: Contribution of variety and combination of support. *Japanese Journal of Child and Adolescent Psychiatry* 53: 623-636, 2012 (in Japanese with English abstract)
- 27) Kishida K, Ishikawa S: Effects of school-based social skills training on depressive and anxiety symptoms in adolescents. *Doshisha Clinical Psychology: Therapy and Research*, 5: 59-71, 2015
- 28) Nagai S: Investigation of the factor structure model and normative data for Depression Self- Rating Scale for Children (DSRS) among junior high-school students. *The Japanese Journal of Research on Emotion*, 16(2): 133-140, 2008
- 29) Suh S, Ikeda M: The current situation of drug problems in the world and the drug abuse prevention targeted to the university students in Japan. *Co* design* 1, 67-84, 2017 (in Japanese with English abstract)
- 30) Shimane T: Current status and issues of drug abuse among adolescents. *Adolescentology* 28: 267–272, 2010 (in Japanese)
- 31) Shimane T: The pharmacist as gatekeeper: Combating medication abuse and dependence. *Yakugaku Zasshi* 133: 617–630, 2013 (in Japanese with English abstract)

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